

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (1) (5)

Author: Dr. Vanessa Vial
SAFRAN, France, vanessa.vial@safrangroup.com

Mr. Anthony Caron
SAFRAN, France, anthony.caron@safrangroup.com

Mr. Alberto Alonso Gonzalez
SAFRAN, France, alberto.alonso-gonzalez@safrangroup.com

Mr. Claude-Martin Brito
SAFRAN, France, claude-martin.brito@safrangroup.com

PPS®X00 HALL THRUSTER DEVELOPMENT STATUS

Abstract

The PPS®X00 is the 500W-class Hall Thruster of the Safran portfolio designed to match the propulsive needs of LEO/MEO small satellite (mainly dedicated to earth observation and navigation functions). Its development program aims at maturing technologies leading to a compact and highly cost efficient product massively marketable within 2023.

The need for low-cost propulsion systems to equip hundreds of platforms is very challenging, be it from the technical, budgetary or production aspects:

- Ability of operating for thousands of hours and cycles in LEO /MEO with a fair performance level at few hundreds Watts.
- Design approach to be relied, when feasible, on COTS components rather than developing specific high-end parts.
- Production rates about 10 to 100 times higher than those typically met for comsats.

Based on these considerations the PPS®X00 architecture development has been driven by a design-to-cost approach: reaching the target cost of the end-product is at the core of the design methodology and is monitored during each development phase and design iteration. As a result, several innovations have been implemented in the discharge chamber, the magnetic circuit and cathode architecture to propose competitive solutions while keeping performance and reliability levels matching the flight requirements. Results obtained so far on the prototype, engineering and structural models show that the right architectural choices have been made: performance is beyond the state of the art of thrusters in this range.

The PPS®X00 has successfully passed the Preliminary Design Review in October 2020, validating the thruster and cathode designs on all three aspects of technical, cost and production-ability.

The paper will present the thruster development approach and status, and in particular the results obtained with the high fidelity engineering and structural models, currently tested in the relevant environments through dedicated confidence mechanical and endurance tests.

The thruster development is supported by ESA ARTES CG (Competitiveness Growth) and by European Union CHEOPS Program (Consortium for Hall Effect Orbital Propulsion System).